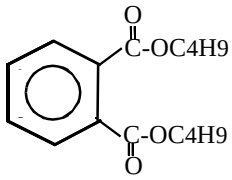
DIBUTYLPHTHALATE

Dibutylphthalate is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 84-74-2

Molecular Formula: $C_{16}H_{22}O_4$



Dibutylphthalate is a colorless to faint yellow, oily liquid with a slight characteristic ester odor. It is very soluble in acetone, benzene, alcohol, and ether, as well as in most organic solvents and oils, but is only slightly soluble in water (Sax, 1987).

Physical Properties of Dibutylphthalate

Synonyms: n-butyl phthalate; 1,2-benzenedicarboxylic acid dibutyl ester; DBP; phthalic acid dibutyl ester

Molecular Weight:	278.34
Boiling Point:	340 °C
Melting Point:	-35 °C
Flash Point:	171 °C (340 °F) open cup
Vapor Density:	9.58 (air = 1)
Density/Specific Gravity:	1.0459 at 20/4 °C (water = 1)
Vapor Pressure:	1.4×10^{-5} mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	4.72
Water Solubility:	11.2 mg/l at 25 °C
Henry's Law Constant:	4.6×10^{-7} atm-m^3/mole
Conversion Factor:	1 ppm = 11.4 mg/m^3

(Howard, 1990; HSDB, 1991; Merck, 1983; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Dibutylphthalate is used as a plasticizer in nitrocellulose lacquers, elastomers, explosives, and nail polish. It is also used as a solvent for perfume oils; in safety glass; in printing inks; resin solvents; paper coating and in adhesives (HSDB, 1991). Dibutylphthalate has been detected in the air of new cars and inside homes where products containing dibutylphthalate, such as vinyl

floors, are used (U.S. EPA, 1994a).

Dibutylphthalate was registered for use as a pesticide; however as of January 1, 1987, it is no longer registered for pesticidal use in California (DPR, 1996).

The primary stationary sources that have reported emissions of dibutylphthalate in California are manufacture of millwork, plywood and structural members, manufacture of miscellaneous plastics products, and miscellaneous manufacturing facilities (ARB, 1997b).

B. Emissions

The total emissions of dibutylphthalate from stationary sources in California are estimated to be at least 2,400 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Dibutylphthalate may occur in soils by microbial biosynthesis (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of dibutylphthalate. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient data from a rural site in College Station, Texas from 1979-80 with a reported mean concentration of 1.40 micrograms per cubic meter or 0.12 parts per billion (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

A field study conducted in southern California measured dibutylphthalate levels inside 125 homes. At each home, two consecutive 12-hour samples were collected. Concurrent samples were also collected outside of 65 of those homes. The average indoor concentration was 620 nanograms per cubic meter. Indoor levels were approximately 15 times higher than outdoor levels (ARB, 1992b).

ATMOSPHERIC PERSISTENCE

Based on its vapor pressure, dibutylphthalate is expected to partition between the gas and particle phases in the atmosphere, and to be at least partially in the gas phase (consistent with the data of Ligocki et al. (1985) for diethylphthalate and dioctylphthalate). In the gas phase, dibutylphthalate will react with the OH radical, and be subject to wet deposition (Ligocki et al., 1985). The atmospheric half-life and lifetime of dibutylphthalate due to reaction with the OH radical are calculated to be 1.1 days and 1.6 days, respectively (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Dibutylphthalate emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to dibutylphthalate are inhalation and ingestion.

Non-Cancer: Dibutylphthalate may cause eye and upper respiratory tract irritation. Limited studies of chronic inhalation exposure to dibutylphthalate in animals demonstrated decreased body weight gain and increased lung weight relative to body weight, and an increase in brain weight as a percent of body weight. Adverse liver effects were observed in chronic and acute oral studies on animals (U.S. EPA, 1994a).

The U.S. EPA has not established a Reference Concentration (RfC) for dibutylphthalate. The oral Reference Dose (RfD) is 0.1 milligrams per kilogram per day based on increased mortality in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

There are no human studies available on adverse reproductive or developmental effects from exposure to dibutylphthalate. Adverse effects on fetal development and male reproduction from oral exposure to dibutylphthalate have been reported in animal studies (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of dibutylphthalate in humans or animals. The U.S. EPA has classified dibutylphthalate as Group D: Not classifiable as to human carcinogenicity based on insufficient evidence in humans and animals (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified dibutylphthalate as to its carcinogenicity (IARC, 1987a).